

We Claim:

1. A wireless local area network comprising:

a plurality of wireless access points each having a predetermined coverage area;

5 a plurality of wireless clients for establishing a wireless link with at least one wireless access point, wherein at least a portion of wireless clients are within the respective coverage areas of at least a portion of wireless access points;

a load balancer for balancing distribution of wireless clients among wireless access points comprising:

10 a tracking implementation for tracking at least one telemetry parameter characteristic of each wireless client's wireless link with each respective wireless access point;

a goal implementation for comparing the at least one telemetry parameter against at least one predetermined goal to obtain a fitness measure;

15 a control implementation for varying the operation of at least one of the respective wireless access points and wireless clients in response to the fitness measure, so as to balance the distribution of wireless clients among the respective wireless access points.

20 2. The wireless local area network of claim 1 wherein the tracking implementation and goal implementation are part of a "fitness measure" subsystem of the load balancer.

3. The wireless local area network of claim 1 wherein the at least one telemetry parameter characteristic of each wireless link is at least one of a signal metric and a data transfer property of the wireless link selected from a group including: packet error rate; signal strength; channel; rate; and processor performance.

4. The wireless local area network of claim 1 wherein the at least one predetermined goal is for at least one of optimizing load distribution and data throughput for each wireless link, and is selected from a group including: achieving equal wireless load distribution on each wireless access point; achieving best obtainable received signal strength for each client-to-AP wireless link; achieving best obtainable link quality to minimize "multipath," signal interference, packet loss; providing best obtainable signal quality at a best obtainable data transfer rate; and providing a low packet error rate.

5. The wireless local area network of claim 1 wherein the at least one predetermined goal is for providing balanced AP digital processing performance, and is selected from a group including: providing adequate CPU processing cycles; providing adequate memory capacity; and providing adequate uplink network capacity.

6. The wireless local area network of claim 1 wherein the control implementation includes at least one control mechanism to vary the operation of at least one of the wireless access points and the wireless clients, wherein the at least one control

mechanism is selected from a group including: a WLAN client admission control; a mechanism for varying the signal power of at least one of the clients and the access points; a mechanism for changing at least one of the data rate, coding, and modulation of the wireless signal; and a mechanism for varying the packet length and other controllable
5 protocol characteristics.

7. The wireless local area network of claim 6 wherein the control implementation is part of a self-adaptive subsystem of the load balancer and further comprises an implementation for applying the fitness measure to the control mechanisms to
10 build a database of control vectors, and for sorting them by the value of their corresponding fitness.

8. The wireless local area network of claim 7 wherein the implementation for applying the fitness measure comprises an adaptation algorithm for measuring adaptation so
15 as to avoid large performance swings as the load balance progresses toward an optimal state over the course of repeated iterations.

9. The wireless local area network of claim 8 wherein a secondary control loop is included to provide feedback from the adaptive subsystem to accommodate modifications
20 in the fitness measure.

10. The wireless local area network of claim 9 further comprising a feedback

processing implementation for processing insensitive telemetry measures so as to be de-weighted and processes sensitive parameters to be more heavily weighted, so as to regulate control values to the access points.

5 11. The wireless local area network of claim 8 wherein the adaptive algorithm is selected from a group including: gradient search; neural network; simulated annealing; and genetic algorithm.

10 12. The wireless local area network of claim 1 wherein the load balancer includes an implementation whereby it can modify the fitness measure definition, so as to achieve any desired or practical load distribution or to adapt to variations in network demand or other changing performance factors.

15 13. The wireless local area network of claim 1 wherein the load balancer is implemented on at least one: of software; a discrete unit located on one of a centralized component on the network and within at least one access point; and a functional process distributed among at least some of the access points.

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